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EXAMINER

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**BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES**

Application Number: 10/518,934  
Filing Date: December 22, 2004  
Appellant(s): TOHJI ET AL.

**MAILED**  
**OCT 02 2007**  
**GROUP 1700**

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Jennifer M. Hayes  
For Appellant

**EXAMINER'S ANSWER**

This is in response to the appeal brief filed June 20, 2007, appealing from the  
Office action mailed May 26, 2006.

**(1) Real Party in Interest**

A statement identifying by name the real party in interest is contained in the brief.

**(2) Related Appeals and Interferences**

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

**(3) Status of Claims**

The statement of the status of claims contained in the brief is correct.

**(4) Status of Amendments After Final**

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

**(5) Summary of Claimed Subject Matter**

The summary of claimed subject matter contained in the brief is correct.

**(6) Grounds of Rejection to be Reviewed on Appeal**

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

**(7) Claims Appendix**

The copy of the appealed claims contained in the Appendix to the brief is correct.

**(8) Evidence Relied Upon**

6,051,614	HIRAI ET AL.	04-2000
4,484,992	BUHLER ET AL.	11-1984

**(9) Grounds of Rejection**

The following ground(s) of rejection are applicable to the appealed claims:

***Double Patenting***

***Claims 1 and 3-5 remain provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 1 of copending Application No. 10/507,895.***

Although the conflicting claims are not identical, they are not patentably distinct from each other because both sets of claims are directed to photocatalysts comprising a capsule structure comprising a cadmium compound shell and a void, and further characterized by supporting platinum thereon.

The combination of claims 1 and 3-5 in the instant application reads upon that of claim 1 in the copending '895 application.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

(This rejection is not being appealed at the present time; please see the footnote in Appellants' Brief at page 8.)

***Claim Rejections - 35 USC § 103***

***Claims 1-3, 6-8, and 10-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hirai et al. (U. S. Patent No. 6,051,614).***

Hirai et al. disclose a method for preparing a non-aqueous dispersion of metallic particles and/or metal compound particles, said particles being advantageously used for producing catalytic metals (col. 2, lines 50-56, of Hirai et al.; considered to read upon "photocatalyst").

The method involves obtaining aqueous dispersions of metal particles such as metal sulfides (e.g., sulfides of metals such as cadmium) by a conventional method in which an aqueous solution of a metal salt is treated with, for example, a sulfide-forming agent. For example, cadmium sulfide can be obtained by treating an aqueous solution of a metal salt with agents such as sodium sulfide. Depending on what type of metallic particles and/or metal compound particles are desired to be obtained, agents such as sodium hydroxide (col. 5, line 32) may also be employed. See col. 4, line 66 to col. 5, line 35 of Hirai et al. (considered to read upon **claims 8, 10, 12, 15, and 18**).

Examples of the metal compound particles of the aqueous dispersion to be used in Patentees' invention include particles of metal hydroxides and oxides, e.g., those of metals such as cadmium. See col. 4, line 66 to col. 5, line 5 of Hirai et al. (considered to read upon **claims 13 and 14**).

Exemplary metal salts to be employed in Patentees' invention include halides, and nitrates. See col. 6, lines 6-10 of Hirai et al. (considered to read upon **claims 15-17**).

The particle size of the thus-obtained metal compound particles in the aqueous dispersion ranges from 1 nm to 3  $\mu\text{m}$  (3000 nm). See col. 5, lines 39-41 of Hirai et al.

Hirai et al. do not disclose that the particles exhibit a "cadmium compound shell and a void", or having pores "extending from its surface to its interior" (**claims 1, 6, and 7**).

However, because the reference teaches methods for producing particles comparable to that instantly claimed, it would have been obvious to one of ordinary skill in the art at the time the invention was made to reasonably expect that the particles produced by the processes disclosed in Hirai et al. would exhibit a shell and a void, absent the showing of convincing evidence to the contrary.

***Claims 1-8, 12, and 19-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Buhler et al. (U. S. Patent No. 4,484,992).***

Buhler et al. disclose a catalyst comprising a cadmium sulfide/semiconductor powder, which is at least partially coated with a noble metal. See col. 2, lines 28-33 of Buhler et al.

Examples of the noble metal include platinum. See col. 3, lines 36-39 of Buhler et al.

The noble metal particles on the semiconductor powder preferably have a particle size ranging from 10 angstroms to 1000 angstroms (1 to 100 nm). See col. 3, lines 62 and 63 of Buhler et al.

Because Buhler et al. is considered to read upon **claims 1-5** in their present form, the claim limitations recited in **claims 6 and 7** (regarding the presence of pores) are considered encompassed by Buhler et al.

These disclosures are considered to read upon **claims 1-7**.

The catalyst can be prepared via any of a number of methods, such as by photocatalytic deposition of the metals on the semiconductor powders, advantageously with the addition of acid or salts thereof, in an aqueous solution or suspension of a suitable metal compound or a mixture of suitable metal compounds (col. 4, lines 40-46). See col. 4, line 40 to col. 5, line 66 of Buhler et al.; this disclosure is considered to read upon **claims 8, 12, 19, and 20**.

Patentees' catalyst is useful in a process for the selective production of hydrogen by means of heterogeneous photoredox catalysis by reacting, e.g., mixtures of water and alkali metal sulfites or sulfides under the action of light in a suspension of a cadmium sulfide/semiconductor (col. 2, lines 23-32), said reaction employing light sources such as sunlight, or any desired light having a wavelength, depending on the semiconductor, between approximately 200 and 650 nm. See col. 4, lines 15-27 of Buhler et al. (considered to read upon **claims 21-23**).

Although the reference does not specifically disclose a “shell and a void”, the catalyst of Buhler et al. is considered to structurally read upon the claims in their present form.

It is well settled that when a claimed composition appears to be substantially the same as a composition disclosed in the prior art, the burden is properly upon the applicant to prove by way of tangible evidence that the prior art composition does not necessarily possess characteristics attributed to the CLAIMED composition. In re Spada, 911 F.2d 705, 15 USPQ2d 1655 (Fed. Circ. 1990); In re Fitzgerald, 619 F.2d 67, 205 USPQ 594 (CCPA 1980); In re Swinehart, 439 F.2d 2109, 169 USPQ 226 (CCPA 1971).

### ***Allowable Subject Matter***

Claim 9 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The cited references do not teach or suggest the employment of sodium sulfite in making cadmium sulfide. Buhler et al. at col. 2, lines 23-32 disclose sodium sulfite as an exemplary reactant in the selective production of hydrogen.

### **(10) Response to Argument**

In response to Appellants’ arguments traversing the Hirai et al. reference, it is noted that while Hirai et al. may disclose a “process different from the characteristic



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process for forming the process of the present invention”, the “non-aqueous dispersion of the metal (compound) particles” obtained therefrom are considered to continue to read upon Appellants’ claims in their present form, which define a structure *comprising* a shell and a void—the instant claims do not reflect whether the claimed photocatalyst is in particulate form, in a dispersion, or in an aqueous medium, nor do they reflect the physical states of the components employed to obtain the claimed photocatalyst.

Although Hirai et al. disclose the formation of an aqueous dispersion of particles, the reference does not explicitly disclose that the particles themselves are not of a shell-and-void structure, nor does the reference explicitly disclose that the particles are of a shell-and-void structure. Because the reference teaches the formation of metal sulfide particles via employing components comparable to those respectively recited in the instant claims, one of ordinary skill in the art would find reasonable expectation that the particles of Hirai et al. *could* exhibit a shell-and-void structure.

Further, although Hirai et al. do not disclose the specific term “dropping” in describing Patentees’ method of treating an aqueous solution of a metal salt with agents such as sodium sulfide, the prior art’s use of terms such as “treating”, “contacting”, is considered synonymous with “dropping”.

It is considered that, from the teachings of Hirai et al. at col. 4, line 66 to col. 5, line 3, one of ordinary skill in the art would select the necessary starting materials (e.g., metal oxide, sulfide-forming agent), to obtain cadmium sulfide.

A reference may be relied upon for all that it would have reasonably suggested to one having ordinary skill in the art, including non-preferred embodiments. Merck &

Co. v. Biocraft Laboratories, 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. Denied, 493 U.S. 975 (1989).

In response to Appellants' arguments that the "Examiner has not provided a reasonable basis for the assertion that the prior art references *inherently* meet the elements of the present claims", the Examiner respectfully submits that the cited references have been applied against the instant claims in rejections based on obviousness, not on inherency.

In response to Appellants' arguments traversing Buhler et al., it is considered that while the catalyst of Buhler et al. is "useful in a process for the selective production of hydrogen...", the reference is relied upon for its teachings regarding the catalyst, and not its use.

In response to Appellants' arguments that Buhler et al. "does not refer to 'a catalyst' and 'a process for producing a catalyst'", Appellants are respectfully directed to col. 4, lines 38-45, wherein:

"The catalyst to be employed... can be prepared, for example, as follows:

1. By photocatalytic deposition of the metals on the semiconductor powders..."

Additionally, col. 5, lines 47-50 of Buhler et al. state:

- "5. By treating the semiconductor powders with the vapors of metals, especially treating..., cadmium sulfide or cadmium sulfoselenide powders with the vapours of platinum..."

And, lastly, Examples 1 and 2 of Buhler et al., each of which are entitled, "CADMIUM SULFIDE COATED WITH PLATINUM".

The coating of cadmium sulfide with platinum is considered to correspond to Appellants' invention.

Although the "technical concept" of Buhler et al. may differ from the claimed invention, the teachings therein are considered to structurally read upon Appellants' claims.

Where the claimed and prior art compounds possess a close structural relationship and a specific significant property in common which renders the claimed compounds obvious to one skilled in the art, they are effectively placed in the public domain and unpatentable per se, even though the applicant has discovered that they possess an additional activity. In re Mod, et al. (CCPA 1969) 408 F2d 1055, 161 U. S. P. Q. 281.

In response to Appellants' arguments that Buhler et al. do not teach the claimed methods for producing the claimed photocatalyst, the Examiner respectfully submits that the "obvious to try" tactic is not being applied. Rather, Buhler et al. is relied upon for its teachings regarding the deposition of metals—such as platinum—onto semiconductor powders—such as cadmium sulphide—via suspending the powder in an aqueous solution of a suitable metal compound (col. 4, lines 40-46). Further, Appellants' reference to "various mixtures of water and alkali metal sulfites..." appears to be taken from col. 2, lines 23-32 of Buhler et al., which actually states: "...the selective production of hydrogen by means of heterogeneous photoredox catalysis by **reacting**,

e.g., mixtures of water and alkali metal sulfites or sulfides **under the action of light in a suspension of a cadmium sulfide/semiconductor...** (emphasis added by Examiner). That is, water is reacted with an alkali metal sulfite (e.g., sodium sulfite) under the action of light in the presence of a suspension of platinum-coated cadmium sulfide/semiconductor. This disclosure is considered to read upon Appellants' "suspending photocatalyst particles... in a solution containing sodium sulfite and applying light thereto."

At col. 4, lines 15-27 of Buhler et al., specific light sources are disclosed—specifically sunlight (line 19) which is both solar and visible.

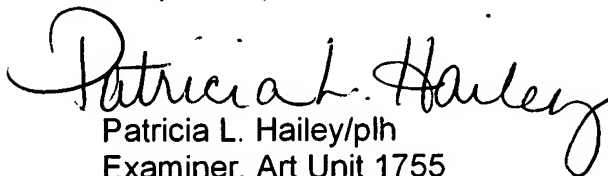
For these reasons, Buhler et al. is considered to read upon Appellants' claims.

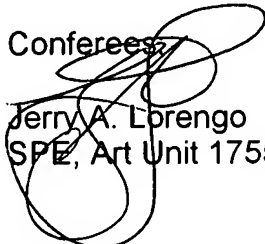
**(11) Related Proceeding(s) Appendix**

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

  
Patricia L. Hailey/plh  
Examiner, Art Unit 1755  
September 26, 2007

Conferees:  
  
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